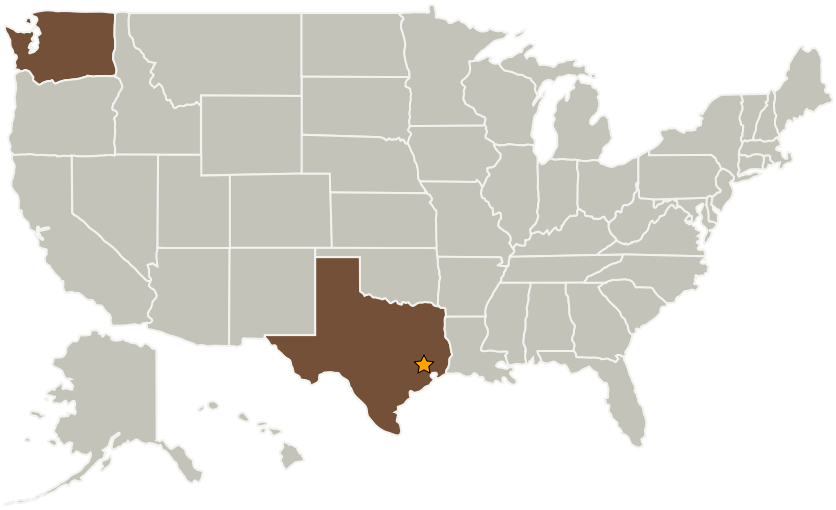
Vacuum-Compatible Multi-Axis Manipulator/Machining Center for Long-Duration Space Missions, Phase I

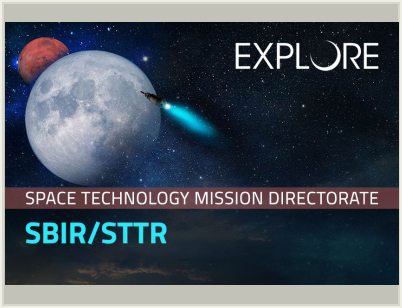
Completed Technology Project (2007 - 2007)

Project Introduction

NASA has many needs for maintenance and repair technologies for long-duration human space missions. We propose to develop a compact, portable, vacuum-compatible, multi-axis Manipulator/Machining Center (M/MC) to satisfy many of NASA's needs. Our M/MC will provide complex manipulation during: layer-additive manufacturing; collection of geometric data for reverse-engineering; real-time non-destructive evaluation; and non-destructive material property determination. Our M/MC will also finish-machine near-net-shape parts produced using layer-additive manufacturing. Design features of our M/MC will: minimize mass, volume, and power consumption while providing required capabilities; maximize life and reliability; and enable our M/MC to operate in space-based vacuum, microgravity, and partial-gravity environments. In Phase I, we will: generate a preliminary design of our M/MC; project the machining performance, mass, volume, and power consumption of our M/MC; and show how our M/MC can be integrated with layer-additive equipment. In Phase II, we will design-in-detail, build, and test a prototype M/MC. In Phase III, we will design, build, and sell M/MCs to the government and private sector.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Beck Engineering, Inc.	Supporting Organization	Industry	Port Orchard, Washington

Primary U.S. Work Locations	
Texas	Washington

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.4 Manufacturing
    - TX12.4.5 Nondestructive Evaluation and Sensors